CAPITOL
Technology University

March 14, 2023

Dr. James D. Fielder, Jr.
Secretary of Maryland Higher Education
Maryland Higher Education Commission
6 N. Liberty Street
Baltimore, MD 21201

Dear Dr. Fielder,

Capitol Technology University is requesting approval to offer a **Master of Education (MEd) in Cyber Science.** The degree curriculum will be taught using a significant number of existing faculty at our university and will be supplemented by new courses supporting the **Master of Education in Cyber Science.** The mission of Capitol Technology University is to provide practical education in engineering, computer science, information technology, and business that prepares individuals for professional careers and affords the opportunity to thrive in a dynamic world. A central focus of the university's mission is to advance practical working knowledge in areas of interest to students and prospective employers within the context of Capitol's degree programs. The university believes that an **Master of Education in Cyber Science** is consistent with this mission.

Educational organizations are reporting significant workforce shortages of trained personnel with a masters' degree and experience in leading educational organizations, especially in the domain of cyber science. Moreover, the shortage is growing each year with increasing demand in cyber science and the annual departure of large numbers of existing data professionals who are reaching retirement age. This program is in response to that need; the **Master of Education in Cyber Science** degree is for new master's level graduates and non-traditional students (i.e., experienced education, data, and statistical personnel) who desire to advance in their careers by gaining leadership skills in the Educational and Cyber Science fields.

To respond to needs of the business, cyber and security industries, we respectfully submit for approval a Master of Science in Education (MEd) in Cyber Science. The required proposal is attached as well as the letter from me as university president confirming the adequacy of the university's library to serve the needs of the students in this degree.

Respectfully,

Bradford L. Sim, PhD

President

CAPITOL
Technology University

March 14, 2023

Dr. James D. Fielder, Jr.
Secretary of Maryland Higher Education
Maryland Higher Education Commission
6 N. Liberty Street
Baltimore, MD 21201

Dear Dr. Fielder,

This letter is in response to the need for confirmation of the adequacy of the library of Capitol Technology University to support the proposed **Master of Education (MEd) in Cyber Science.** As president of the university, I confirm that the library resources, including support staff, are more than adequate to support the **Master of Education (MEd) in Cyber Science.** In addition, the university is dedicated to, and has budgeted for, continuous improvement of its library resources.

Respectfully,

Bradford L. Sim, PhD
President

Office Use Only: PP#

Cover Sheet for In-State Institutions
New Program or Substantial Modification to Existing Program

Institution Submitting Proposal	Capitol Technology University

Each action below requires a separate proposal and cover sheet.

- (●) New Academic Program
- ( ) New Area of Concentration
- ( ) New Degree Level Approval
- ( ) New Stand-Alone Certificate
- ( ) Off Campus Program
- ( ) Substantial Change to a Degree Program
- ( ) Substantial Change to an Area of Concentration
- ( ) Substantial Change to a Certificate Program
- ( ) Cooperative Degree Program
- ( ) Offer Program at Regional Higher Education Center

Payment Submitted: (●) Yes ( ) No Payment Type: ( ) R*STARS # 94380 (●) Check # 94380 Payment Amount: $850.00 Date Submitted: 3/15/2023

Department Proposing Program	Department of Graduate Programs	
Degree Level and Degree Type	Master of Education (MEd)	
Title of Proposed Program	MEd in Cyber Science	
Total Number of Credits	30	
Suggested Codes	HEGIS: 824.00	CIP: 13.0603
Program Modality	( ) On-campus (●) Distance Education (fully online) ( ) Both	
Program Resources	(●) Using Existing Resources ( ) Requiring New Resources	
Projected Implementation Date (must be 60 days from proposal submisison as per COMAR 13B.02.03.03)	(●) Fall ( ) Spring ( ) Summer	Year: 2023
Provide Link to Most Recent Academic Catalog	URL: https://www.captechu.edu/current-students/academic-resources	
Preferred Contact for this Proposal	Name: Mr. Allen Exner	
	Title: Director of Library Services and Information Literacy	
	Phone: (240) 965-2470	
	Email: ahexner@captechu.edu	
President/Chief Executive	Type Name: Dr. Bradford Sims	
	Signature: [signature]	Date: 03/14/2023
	Date of Approval/Endorsement by Governing Board:	03/14/2023

Revised 1/2021

PROPOSAL FOR:

__X__NEW INSTRUCTIONAL PROGRAM

_____ SUBSTANTIAL EXPANSION/MAJOR MODIFICATION

_____ COOPERATIVE DEGREE PROGRAM

__X__WITHIN EXISTING RESOURCES or____REQUIRING NEW RESOURCES

CAPITOL Technology University

Institution Submitting Proposal

Fall 2023
Projected Implementation Date

Master of Education

(MEd)
Award to be Offered

Master of Science in Education in Cyber Science
Title of Proposed Program

824.00
Suggested H.E.G.I.S. Code

13.0603
Suggested C.I.P. Code

Doctoral Programs
Department of Proposed Program

Dr. Ian McAndrew
Name of Department Head

Dr. William Butler
VPAA

whbutler@captechu.edu
Contact E-Mail Address

240-965-2458
Contact Phone Number

3-14-23
Signature and Date

President/Chief Executive Approval

MARCH 14, 2023
Date

Date Endorsed/Approved by Governing Board

Proposed Master of Education in Cyber Science
Department of Doctoral Programs
Capitol Technology University
Laurel, Maryland

A. Centrality to Institutional Mission and Planning Priorities:

1. **Provide a description of the program, including each area of concentration (if applicable), and how it relates to the institution's approved mission.**
Master of Education in Cyber Science Program Description:

The **Master of Education in Cyber Science** degree is a unique program designed to meet the emerging needs of today's economy, which is experiencing significant labor gaps in critical cyber professions. According to the latest International Information System Security Certification Consortium (ISC)² 2022 Cybersecurity Workforce Study, this cybersecurity workforce gap threatens the most foundational functions of the profession, such as risk assessment, oversight and critical systems patching, according to the study. More than half of employees at organizations with workforce shortages feel that staff deficits put their organization at a "moderate" or "extreme" risk of cyberattacks. In addition, that risk increases substantially when organizations have a significant staffing shortage (ISC², 2022). A 2016 Center for Strategic and International Studies (CSIS) survey of IT decision-makers across eight countries found that 82 percent of employers report a shortage of cybersecurity skills, and 71 percent believe this talent gap causes direct and measurable damage to their organizations. According to CyberSeek, funded by the National Initiative for Cybersecurity Education (NICE), the United States faced a shortfall of almost 314,000 cybersecurity professionals as of January 2019. Increasing the capacity of colleges and universities to produce more educators is a critical component in addressing these shortfalls. Producing more quality faculty is but one component in addressing these shortfalls.
Capitol Technology University is uniquely positioned academically to offer this degree with its geographical location within Maryland. The surrounding area has some of the most important Cyber related agencies and institutions in the world that operate globally. The **Master of Education in Cyber Science** program allows students to conduct extensive, sustained, original research at the highest level in the field about pedagogy, curriculum design and assessment, and evaluating emerging lab, and classroom technologies. The **Master of Education in Cyber Science** is focused on current educators to advance their knowledge and opportunities in teaching and research. The **Master of Education in Cyber Science** also targets industry professionals with a desire to teach at the highest levels and contribute to the body of knowledge (BoK) in Cyber Science. Capitol participates in the inaugural year of the *National* Security Agency (NSA) National-CAE scholarship program focused on producing Ph.D. s committed to teaching in cyber-related programs for four years after graduation. Capitol believes expanding innovative programs like this one, coupled with this focused Doctorate, will increase capacity significantly as one graduate could Chair a new program of several Faculty and hundreds of students, for example.

The proposed **Master of Education in Cyber Science** degree is for current professionals in the field of cyber but with a focus on exposing them to sound pedagogical principles and practical research. The University is uniquely positioned to give those students an avenue to pursue a deep proficiency in this area using an interdisciplinary methodology, cutting- edge courses, and dynamic Faculty. Graduates will contribute significantly to the Cyber Science field through the creation of new knowledge and ideas. The **Master of Education in Cyber Science** program is designed as a doctorate by research where students can quickly engage in leadership, research, and publishing.

The **Master of Education in Cyber Science** program is structured for experienced educators and professionals in the Cyber industry with an appropriate master's degree and professional experience. A student with an appropriate master's degree and no professional experience can enter the program, but that would be less common than experienced professionals. However, there must be a direct link with cyber in the resume, whether US or overseas based. During the program, students will conduct original research in an approved area of Cyber Science. Successful completion of the program culminates in the Master of Education in Cyber Science award.

The completion of the **Master of Education in Cyber Science** program requires the student to produce, present, and defend a doctoral dissertation after receiving the required approvals from the student's Committee and the Ph.D. Review Board, which consists of the Dean with external expertise as needed. Two options exist for completing the **Master of Education in Cyber Science** program. Under the dissertation option, the student will produce, present, and defend a doctoral dissertation after receiving the required approvals from the student's Committee and the Ph.D. Review Board. Under the publication option, the student will produce, present, and defend their original doctoral research after receiving the required approvals from the student's Committee and the Ph.D. Review Board. The student must also publish three original research works in a scholarly peer-reviewed journal(s) of high stature. Two of the three published works may be in a peer-reviewed conference proceeding if the conference is international and approved by the Dean. A student will produce an exegesis culminating the work for their defence.

CSIS, *Hacking the Skills Shortage* (Santa Clara, CA: McAfee, July 2016), https://www.mcafee.com/enterprise/en-us/assets/reports/ rp-hacking-skills-shortage.pdf.
CyberSeek, "Cybersecurity Supply/Demand Heat Map," accessed January 4, 2019, https://www.cyberseek.org/heatmap.html.

2. Explain how the proposed program supports the institution's strategic goals and provide evidence that affirms it is an institutional priority.

Capitol Technology University operates on four strategic goals:

1. **Expand Educational Offerings, Increase Program Completion:** *Capitol Technology University is an institution that offers career-relevant curricula with quality learning outcomes. The strategy includes continuing to expand educational offerings, increasing program completion, and raising learner qualifications and outcomes.*
2. **Increase Enrollment and Institutional Awareness:** *Capitol will accelerate its goal to become more globally renowned and locally active through student, faculty and staff*

activities. Enrollment will grow to 650 undergraduates, 350 masters' students and 350 doctoral candidates.

3. **Improve the Utilization of University Resources and Institutional Effectiveness While Expanding Revenue**: *Capitol will likely continue to be 80% financially dependent on student tuition and fees. We plan to enhance our resources by expanding the range and amount of funding from other streams and aligning costs with strategic initiatives.*

4. **Increase the Number and Scope of Partnerships**: *Capitol's service to our constituents and sources of financial viability both depend upon participation with continuing and new partner corporations, agencies, and schools.*

The proposed **Master of Education in Cyber Science** program supports all the University's four strategic goals. The proposed degree builds upon the existing areas of degrees at the undergraduate level: B.S. in Astronautical Engineering, B.S. in Aviation Professional Pilot, B.S. in Computer Engineering, B.S. in Computer Engineering Technology, B.S. in Computer Science, B.S. in Construction Information Technology and Cybersecurity, B.S. in Construction Management and Critical Infrastructure, B.S. in Construction Safety B.S. in Cyber Analytics, B.S. in Cybersecurity, B.S. in Data Science, B.S. in Electrical Engineering, B.S. in Electrical Engineering Technology, B.S. in Engineering Technology, B.S. in Facilities Management and Critical Infrastructure, B.S. in Information Technology, B.S in Management of Cyber and Information Technology, B.S. in Mechatronics Engineering, B.S. in Mechatronics and Robotics Engineering Technology, B.S. in Software Engineering, and B.S. in Technology and Business Management, B.S in Unmanned and Autonomous Systems, and B.S. in Web Development.

The proposed degree also supports the existing areas of degrees of graduate study, including the Master of Business Administration (M.B.A.), Master of Science (M.S.) in Astronautical Engineering, M.S. in Aviation, M.S. in Aviation Cybersecurity, M.S. in Computer Science, M.S. in Construction Cybersecurity, M.S. in Construction Safety, M.S. in Critical Infrastructure, M.S. in Cyber Analytics, M.S. in Cybersecurity, M.S. in Information Systems Management, M.S. in Engineering Technology, M.S. in Internet Engineering, M.S. in Unmanned and Autonomous Systems Policy and Risk Management, Technical Master of Business Administration (T.M.B.A.) in Business Analytics and Data Science, and T.M.B.A. in Cybersecurity, Doctor of Science (D.Sc.) in Cybersecurity, Doctor of Philosophy (Ph.D.) in Artificial Intelligence, Ph.D. in Aviation, Ph.D. in Business Analytics and Data Sciences, Ph.D. in Construction Science, Ph.D. in Critical Infrastructure, Ph.D. in Emergency and Protective Services, Ph.D. in Human Factors, Ph.D. in Manufacturing, Ph.D. in Occupational Health and Safety, Ph.D. in Product Management, Ph.D. in Quantum Computing, Ph.D. in Technology, Ph.D. in Technology/M.S. Research Methods Combination Program, Ph.D. in Unmanned Systems Applications.

The University's programs have been preparing professionals for the rapid advances in information technology, intense global competition, and increasingly sophisticated technological environments for decades, this degree complements the offerings and that of the new fields of study. The **Master of Education in Cyber Science** follows that tradition and the links with local and national cyber based employers means we offer a degree needed.

The proposed **Master of Education in Cyber Science** is fully supported by the University's Vision 2025 and Strategic Plan 2017-2025. Funding to support the **Master of Education in Cyber Science** is already available within the existing budget.

The University has active partnerships in the private and public areas (e.g., NASA, Parson Corporation, Leidos, Patton Electronics, Lockheed Martin, Northrup Grumman, Cyber Security Forum Initiative, Internal Revenue Service, and National Cryptologic School). The **Master of Education in Cyber Science** degree will provide new opportunities for partnerships. The increase in alliances and the placement of our graduates in our partner institutions will serve to expand the University's enrollment and reputation. While additional students will increase financial resources, new partnerships, and grants in the Cybersecurity Ethics & Law field will help diversify and increase financial resources.

3. **Provide a brief narrative of how the proposed program will be adequately funded for at least the first five years of program implementation. (Additional related information is required in section L.)**
   Capitol Technology University will support the proposed program through the same process and level of support as the University's existing programs. The University has also budgeted funds to support program and course development, online support, office materials, travel, professional development, and initial marketing. There is no substantial impact to the institution due to the advanced budgeting of these funds. If approved, the program will be self-sustaining going forward.

4. **Provide a description of the institution's commitment to:**

   a. **Ongoing administrative, financial, and technical support of the proposed program** The proposed degree is an integral part of the University's Strategic Plan for FY 2017-2025 and forward. The institutional and departmental budgets for FY 2022-2023, as well as the forecasted budgets going forward, include funding for the administrative, financial, and technical support of the new degree.

   b. **Continuation of the program for a period of time sufficient to allow enrolled students to complete the program.**
      Capitol Technology University is fully committed to continuing the proposed **Master of Education in Cyber Science** degree program for a sufficient period to allow enrolled students to complete the program.

B. Critical and Compelling Regional or Statewide Need as Identified in the State Plan:

1. **Demonstrate demand and need for the program in terms of meeting present and future needs of the region and the State in general based on one or more of the following:**

   a. **The need for advancement and evolution of knowledge.**

      The Cyber industry relies on technology, people, and processes as the critical elements required to maintain and grow the industry. This degree matches those critical components by providing research-based and practical exposure.

b. **Societal needs, including expanding educational opportunities and choices for minorities and educationally disadvantaged students at institutions of higher education.**
Capitol Technology University is a diverse multiethnic and multiracial institution with a long history of serving minority populations. The University has a 51% minority student population, with 7% undisclosed. The Black/African American population is 34%. The university has a military/veteran population of 22%. The University also has a 22% female population – a significant percentage given its status as a technology institution. If approved, the proposed **Master of Education in Cyber Science** will expand the field of opportunities for minorities and disadvantaged students.

c. **The need to strengthen and expand the capacity of historically black institutions to provide high quality and unique educational programs.**
While Capitol Technology University is not a historically black institution, the university is a diverse multiethnic and multiracial institution with a long history of serving minority populations. The University has a 51% minority student population, with 7% undisclosed. The Black/African American population is 34%. The University has a military/veteran population of 22%. The university also has a 22% female population – a significant percentage given its status as a technology institution. If approved, the proposed **Master of Education in Cyber Science** will expand the field of opportunities for minorities and disadvantaged students. Given the substantial minority population of Capitol Technology University, it is also reasonable to assert that the **Master of Education in Cyber Science** program will add to the base of minority participation in the Cybersecurity Ethics & Law field.

2. **Provide evidence that the perceived need is consistent with the Maryland State Plan for Postsecondary Education.**

An equity framework and lens.

The University has an executive council, which guides and directs the University at all stages of education. This council is made up of a diverse body of ethnic background and genders. Indeed, the majority of people on the committee are from underrepresented groups, female, and ethnic minority groups. The balance of faculty and staff at the University is at least in line with the diversity of the State and maybe even more so. The student population from diverse groups is in excess of 50% from underrepresented groups.

Capitol Technology University has a long history in supporting the aims of the State in the practice of these at all levels of study. Our student success rate at the doctoral level is approximately twice that of the national average while maintaining a quality standard that is recognized globally with the attraction of international students to the degrees. This is further supported by the commitment from the President of the University in an undergraduate promise that if a graduate does not find employment within three months of graduating, they are offered the possibility to return and take further courses free of charge. Likewise, we are committed to the support of our students and are confident in the success of our students such that we support this commitment to education. The return on investment of our degrees has been nationally recognized and it has been stated that we are within the top 150 universities in America out of 4500 for the return on investment. This too supports the aims of the State

of Maryland that we are accessible and offer a product that will enable all graduates to be successful.

The 2022 Maryland State Plan for Postsecondary Education articulates three goals for postsecondary education:

1. Student access
2. Student success
3. Innovation

Goal 1: Student Access

"Ensure equitable access to affordable and quality postsecondary education for all Maryland residents."

Capitol Technology University is committed to ensuring equitable access to affordable post-secondary education for all Maryland residents. The University meets its commitment in this arena through its diverse campus environment, admissions policies, and academic rigor.

The University addresses Student Access through the following priorities:

- Priority 1: Study the affordability of postsecondary education in Maryland.
- Priority 2: Examine and improve financial literacy programs for students and families to encourage financial planning to pay for postsecondary education.
- Priority 3: Analyze systems that impact how specific student populations access affordable and quality postsecondary education.

The Capitol Technology University community is committed to creating and maintaining a mutually respectful environment that recognizes and celebrates diversity among all students, Faculty, and staff. The University values human differences as an asset and works to sustain a culture that reflects the interests, contributions, and perspectives of members of diverse groups. The University delivers educational programming to meet the needs of diverse audiences. We also seek to instill those values, understanding, and skills to encourage leadership and service in a global multicultural society.

The composition of the University's student body reflects the institution's commitment to diversity. Capitol Technology University has a 51% minority student population, with 7% undisclosed. The Black/African American population is 34%. The University has a military/veteran population of 22%. The University also has a 22% female population – a significant percentage given its status as a technology university.

Achievement gaps: The University provides leveling courses in support of individuals attempting a career change to a field of study not necessarily consistent with their current skills. There are situations where undergraduate courses best serve student needs in subject areas. The University makes those courses available.

The University engages in diversity training for its institutional population, including students. Diversity and inclusiveness are built into the curriculum allowing graduates to operate effectively in a global environment. The University supports multiple diversity-enhancing actions, including team projects and grants across degrees. This has proven effective at supporting numerous aspects of diversity.

Capitol Technology University does not discriminate on the basis of race, color, national origin, sex, age, sexual orientation, or handicap in admission, employment, programs, or activities.

Through its academic programs, Capitol Technology University seeks to prepare all of its graduates to demonstrate four primary characteristics:

- **Employability:** The ability to enter and advance in technical and managerial careers appropriate to their level and area of study immediately upon graduation.
- **Communications:** Mastery of traditional and technological techniques of communicating ideas effectively and persuasively.
- **Preparation of the Mind:** The broad intellectual grounding in technical and general subjects required to embrace future technical and managerial opportunities with success.
- **Professionalism:** Commitment to life-long learning, ethical practice, and participation in professions and communities.

The proposed **Master of Science in Education in Cyber Science** program and University financial aid will be available to all Maryland residents who qualify academically for admission. The University has successfully managed to support Financial Aid for its students since its founding in 1927.

With its academic rigor, the **Master of Education in Cyber Science** program will produce highly qualified Cyber educators with the highest level of skills and abilities to advance their careers. The University has a proven record of rigorous high-quality education in all of its degrees. Five accrediting organizations fully accredit the University. The University receives its regional accreditation from the Middle States Commission on Higher Education (MSCHE). The University also has specialized accreditation from the International Accreditation Council of Business Education (IACBE), Accreditation Board for Engineering and Technology (ABET), National Security Agency (NSA), and Department of Homeland Security (DHS) National Centers of Academic Excellence in Cyber Defence Education (NCAE-CDE). The **Master of Education in Cyber Science** program is consistent with the MSCHE criteria for regional accreditation of the delivery of high-quality higher education. The NCAE-CDE stated objective addressing the Cyber labor and skills shortfall is also addressed by this proposed degree program.

Goal 2: Student Success

"Promote and implement practices and policies that will ensure student success."

The **Master of Education in Cyber Science** courses will be offered online using the Canvas Learning Management System and Zoom. The University provides a tuition structure that is competitive with its competitors. The University tuition structure does not differentiate between in-state and out-of-state students. The University's Student Services provide advising, tutoring, virtual job fair attendance, and other activities supporting student completion and employment for both on-ground and online students.

Students receive information throughout the admissions process regarding the cost to attend the University. The information is also publicly available on the University website. The University's Admissions Office and Office of Financial Aid identify potential grants and scholarships for each student. The Office of Financial Aid also provides plans for each student to reduce potential

student debt. The net cost versus gross costs is identified clearly for the student. Students receive advising from Financial Aid Advisors before enrolling in classes for the first time. Admissions personnel, Student Services Counselors, and Departmental Chairs advise students of the need for academic readiness and degree requirements. Academic Advisors also develop a specific success pathway for each student.

The University's tuition increases have not exceeded 3%. The University also has a tuition guarantee for undergraduates, which means full-time tuition is guaranteed not to increase more than 1% per year above the rate at the time of initial enrollment. The tuition remains at this rate if the student remains enrolled full-time without a break in attendance.

The University provides services and learning tools to guide students to successful degree completion. Programs such as Early Alert give the University's faculty and staff opportunities for early student intervention on the pathway to graduation. This program applies to all students regardless of the mode of course delivery or degree program. Capitol Technology University is also a transfer-friendly institution and participates in multiple programs for government and military credit transfer. Capitol Technology University participates in the Articulation System for Maryland Colleges and Universities (ARTSYS) and has numerous transfer agreements with local institutions at all degree levels.

The University has in place services, tutoring, and other tools to help ensure student graduation and successful job placement. The University hosts a career (job) fair twice a year. The University has an online career center available to all students covering such topics as career exploration, resume writing, job search techniques, social media management, mock interviews, and assistance interpreting job descriptions, offers, and employment packages.

The University also works with its advisory boards, alumni, partners, and Faculty to help ensure the degrees offered at the University are compatible with long-term career opportunities in support of the state's knowledge-based economy.

Goal 3: Innovation

"Foster innovation in all aspects of Maryland higher education to improve access and student success."

Capitol Technology University's past, present, and future are inextricably intertwined with innovation. The University has a long tradition of serving as a platform for the use of new and transformative approaches to delivering higher education. New technology and cutting-edge techniques are blended with proven strategies to enable student success in all classroom modalities as well as in a successful career after graduation. As a small institution, Capitol Technology University has the agility to rapidly integrate new technologies into the curriculum to better prepare students for the work environment. The University designs curriculum in alliance with its accreditation and regulating organizations and agencies.

The University also employs online virtual simulations in a game-like environment to teach the application of knowledge in a practical hands-on manner. The University engages with a partner creating high-level virtual reality environments for use by students pursuing this degree. This use of current technology occurs in parallel with traditional, proven learning strategies. These elements of the University's online learning environment are purposeful and intended to improve

the learning environment for both the student and faculty member. The approach is intentionally designed to increase engagement, improve outcomes, and improve retention and graduation rates. The University believes that innovation is the key to successful student and faculty engagement.

Example: The University engages its students in fusion projects that allow students to contribute their skills in interdisciplinary projects such as those in our Astronautical Engineering and Cyber Labs. In those labs, students become designers, builders, and project managers (e.g., to send a CubeSat on a NASA rocket) and data analysts (e.g., to analyze rainforest data for NASA). The University's students recently launched their latest satellite aboard a NASA rocket from Norway at the beginning of the 2019 Fall Semester. Students enrolled in the proposed **Master of Education in Cyber Science** will be challenged to design, deliver and assess cyber curriculum in a classroom setting under experienced University STEM educators.

The University also supports prior learning assessment. Portfolio analysis is available. The University accepts professional certifications for credit for specific courses. The University also allows students to take a competency exam for credit for required courses up to the current state limits. These are all on an individual basis and approval is needed from the Dean of Doctoral Program. Credit can be given for published research if specific to the degree.

C. Quantifiable and Reliable Evidence and Documentation of Market Supply and Demand in the Region and State:

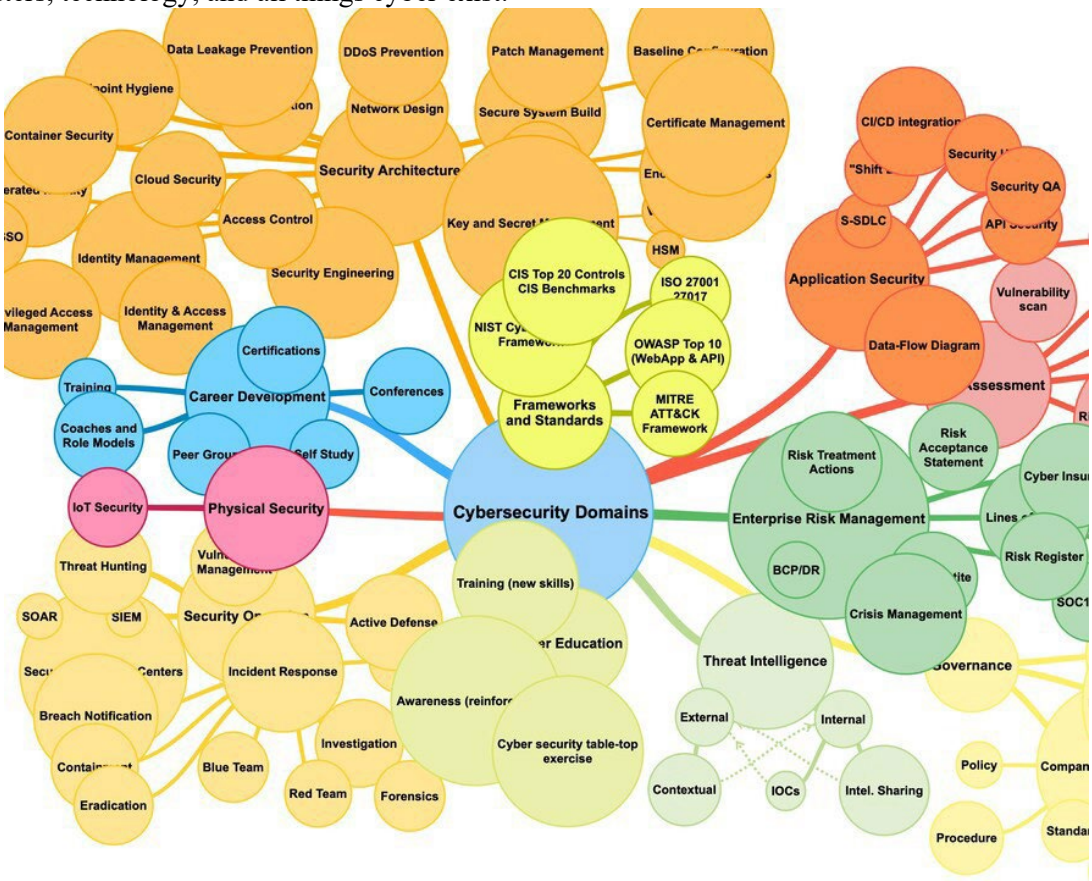
1. **Describe potential industry or industries, employment opportunities, and expected level of entry (*ex: mid-level management*) for graduates of the proposed program.**
   The Department of Commerce National Initiative for Cybersecurity Careers and Studies (NICCS) Workforce Framework for Cybersecurity (NICE Framework) has defined five work roles for the U.S. Government appropriate for this degree program (https://niccs.cisa.gov/workforce-development/nice-framework). Graduates with a **Master of Education in Cyber Science** degree will be expected to fill technical executive and senior-level positions in commercial companies as well as local, state, and federal government with a variety of titles such as:

   - Administrator (Chair, Dean, VP)
   - Cyber Faculty
   - Cyber Instructor (DoC NICE framework work role)
   - Cyber Researcher
   - Cyber Instructional Curriculum Developer (DoC NICE framework work role)
   - Instructional Curriculum Developer Assessor/Evaluator
   - Lab and Classroom Designer
   - Cyber Policy and Strategy Planner (DoC NICE framework work role)
   - Cyber Workforce Developer and Manager (DoC NICE framework work role)
   - Research and Development Specialist (DoC NICE framework work role)

Graduates from the proposed **Master of Education in Cyber Science** will possess the highest knowledge in Cyber related disciplines with the ability to serve as top leaders in their field. Graduates will also possess the required knowledge to serve as subject matter experts and work all levels in the cyber industry within corporations, government agencies, and national defense.

From the printing press to the rise of artificial intelligence, new technology has always played a role in how humans relate to the world and their position in it. Rapid technological progress in the last 50 years has intensely altered how we interact. Now the need for Ethics and Legal implications reach globally and in space.

Cyber Science is an emerging discipline that focused on studying computer programming, embedded systems, networks, telecommunications, computer systems, computer investigations, and cyber operations. **Master of Education in Cyber Science** graduates will study how to design and build curricula focused on student attainment of knowledge in these subject areas. Graduates will also be trained as skilled researchers to contribute to the growing knowledge of this emerging discipline. The field is rapidly expanding, and, as shown by the figure below, it affects every discipline where computers, technology, and all things cyber exist.



Topic areas where Cyber Science is currently established.

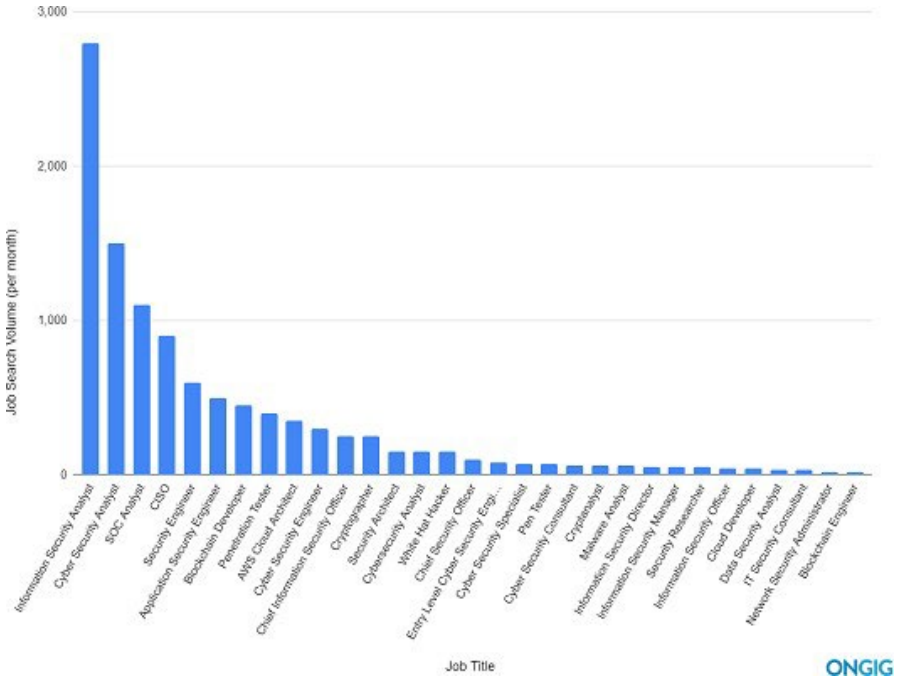
2. **Present data and analysis projecting market demand and the availability of openings in a job market to be served by the new program.**

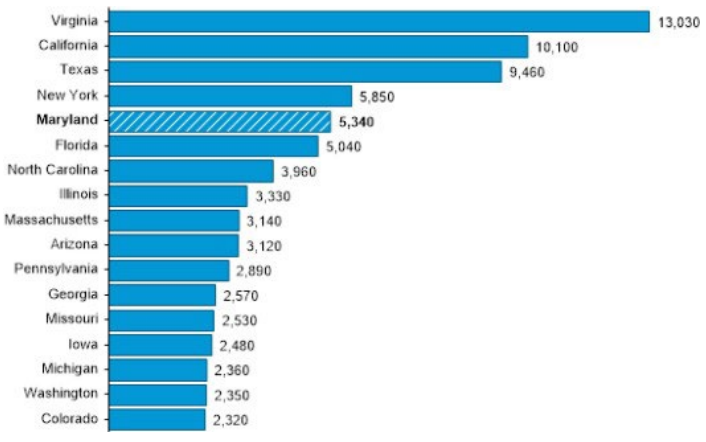
   Technology will only continue to advance. And as it does, more attention will have to be directed at the ways that our interactions with humans and machines are changing because of those advancements. Outside of the obvious research benefits that come from the rise of Cyber Science in the field, there are many real-world, immediate applications for the field.

There are currently 15,864 Cybersecurity related jobs advertised on (careerbuilder.com) nationwide and 545 in Maryland. Zip Recruiter (https://www.ziprecruiter.com/) shows manager-level positions average $116,000, and Indeed (https://www.indeed.com/?from=gnav-title-webapp) shows $105,000. While ZipRecruiter is seeing annual salaries as high as $212,000 and as low as $75,000, the majority of Cyber manager salaries currently range between $98,000 (25th percentile) to $143,500 (75th percentile), with top earners (90th percentile) making $201,000 annually across the United States. The average pay range for a Cyber Psychologist varies greatly (by as much as $65,500), which suggests there may be many opportunities for advancement and increased pay based on skill level, location, and years of experience.

This is further supported by the postings on monster.com and simplyhire.com. Most engineering work can used non USA companies and facilities to design, manufacture or research. A **Master of Education in Cyber Science** is needed more than ever to ensure these companies remain global brands and profitable. There is no evidence to suggest this will reduce in the next 5 years or beyond.

Job Titles in Cyber Technology





3. **Discuss and provide evidence of market surveys that clearly provide quantifiable and reliable data on the educational and training needs and the anticipated number of vacancies expected over the next 5 years.**

With the growth of new technologies and an increasingly interconnected world, the field of Cybersecurity Ethics & Law has emerged as a unique discipline. Defined as the discipline of understanding the psychological processes related to, and underlying, all aspects and features of technologically interconnected human behavior (https://www.apa.org/monitor/2019/02/cyberthreats), Cybersecurity Ethics & Law includes multiple and intersecting disciplines such as human–computer interaction, computer science, engineering, and psychology. Advances in global communication and technologies, social media and networking sites, and technological intimacy created through developments such as the iPhone have created shifts in perspectives and behaviors (https://chi2021.acm.org/). Moreover, there is expanded recognition of Cybersecurity Ethics & Law through professional associations, such as the American Psychological Association (APA), as well as via new journals, conferences, and emerging academic programs.

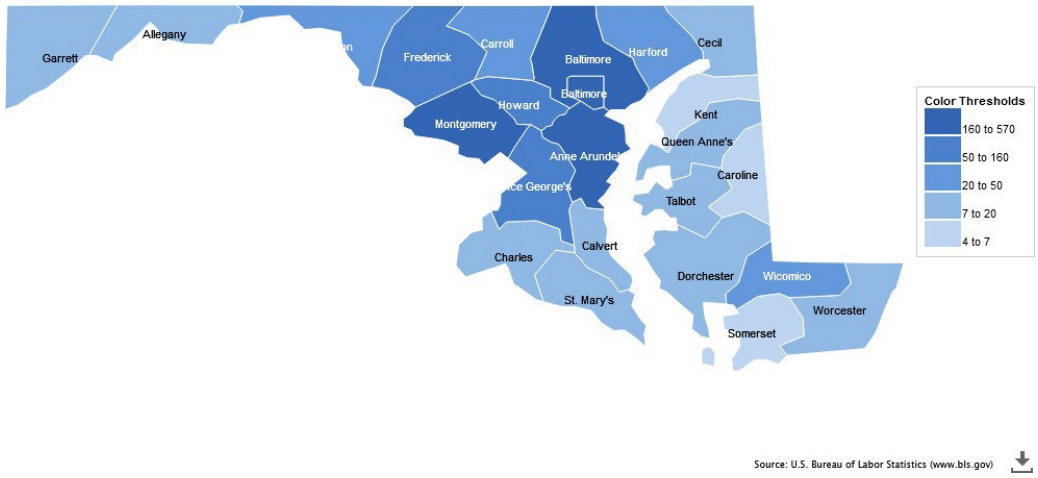
Research literature and presentations in the area of Cybersecurity Ethics & Law have primarily attended to personality variables, perceptual processes, emotional functioning, and behavioral responses. Five major areas identified in the literature as especially relevant to the field are examined, including online behavior and personality; social media use and psychological functioning; games and gaming; telepsychology; and virtual reality, artificial intelligence, and applications. In addition, future directions in Cybersecurity Ethics & Law as it relates to ethics, clinical work, age and disability, education and training, and research are discussed. As the field of Cybersecurity Ethics & Law is relatively in its infancy, psychologists are well positioned to inform this innovative discipline through interdisciplinary collaborations (https://sigchi.org/).

There are numerous fields in which Cyber Educators can be employed. Among the most common are:

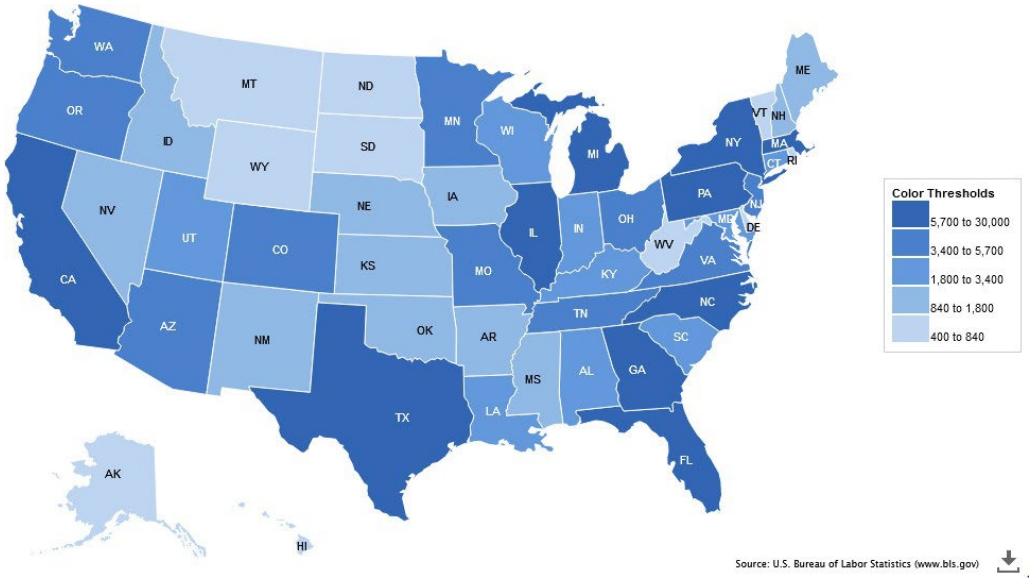
- **Research** – The vast majority of Cyber Educators are employed in the research sector. They might work for a private research firm or public or government institutions, conducting experiments and studies on highly specific topics within the field.
- **Consultation** – Other educators in this field act as consultants to businesses and industries whose products or services could benefit from the expertise of someone that studies human-technology interaction. For example, a Cyber Educator might work with a mobile phone app developer to design an app that gives users tools to easily report abusive situations like cyberbullying.
- **Education** – Cyber Educators will be employed in the academic sector. Employment opportunities usually revolve around teaching and conducting research at colleges or universities, although some public or private school districts may have an interest in employing an expert in human-technology interaction.
- **Works to Improve Human-Technology Interaction** – Another important role of Cybersecurity Educators is to help companies that develop technologies to do so in a manner that enhances human behavior rather than detracts from it. Cyber Science can help make technology more valuable and less detrimental to our daily lives by facilitating communication, improving social interactions, and streamlining how we work and learn.

It can only be estimated from data from the Bureau of Labor Statistics that Maryland is positioned in the number of Cyber Educator positions; however, in the surrounding region and the nation,

that increases significantly. As the world now sources globally Cyber education will become critical. Every new significant project involving humans and cyber technology will need a Manager at a PhD level. It is not unreasonable to assume that the demand will far outstrip the number we can educate to the quality needed (careerjobs.com).Locations for potential Cyber education positions in Maryland



Locations for potential Cyber education positions nationally



TOTAL COMPENSATION BY CLEARANCE

	2018 COMPENSATION	2020 COMPENSATION	% CHANGE FROM 2018
Confidential			
Secret	$84,313	$87,388	4%
Top Secret	$108,929	$107,192	-2%
Top Secret/SCI	$103,112	$111,371	8%
DoE (Q or L)			
Intel	$119,653	$122,463	2%
DHS			
Public Trust	$83,462	$85,346	2%
Other Government Agency	$98,672	$97,054	-2%

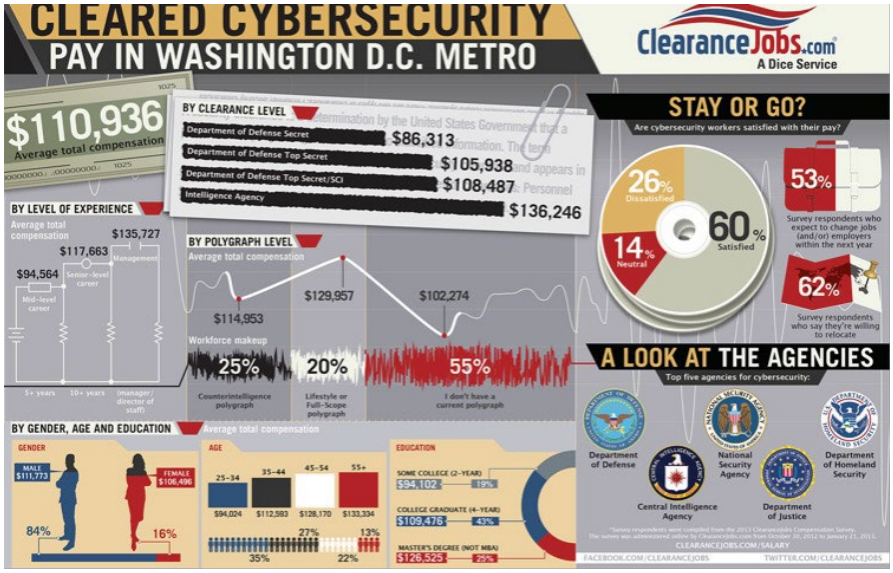
Gray box indicates <20 responses.

(https://news.clearancejobs.com/2020/11/06/maryland-cleared-career-opportunities-cleared-compensation)

4. Data showing the current and projected supply of prospective graduates.

There are no masters of science in education degrees in Cyber Science in Maryland. The proposed **Master of Education in Cyber Science** would be the first. As stated above, these new positions will be needed and the skill set on graduation will allow them to work in Government and industry where management needs to be to compete in the global world.

The table below shows the types of skills needed and expected opportunities in human-computer interaction-type positions. These are primarily taught at Capitol Technology University. We are situated geographically and technically to support their interest in research qualifications leading to a doctorate.



Management	Information Assurance	Technical
• Cybersecurity Strategy • Legal and Regulatory • Cybersecurity business case formulation • IT Base skills • Staff Management skills/ Leadership skills • Personnel Security • Multi-Disciplinary skills (technology, people etc) • Communication skills • Cyber-Criminal Psychology • Cyber-Ethics Skills	• Cybersecurity Policies, Standards and Procedures • Risk Management • System Accreditation • Compliance Checking • Audit and Monitoring • User Rights and Responsibilities • Incident Management Process Design • Assurance, trust and confidence mechanisms	• IT technical skills (security management) • IT technical skills (Security deployment) • Security Design Principles e.g. zoning • Resilient Infrastructure • Data Protection/ System administration • Cryptographic and Applied Crypto Skills • Data custodianship • Operational Security • Incident Management

D. Reasonableness of Program Duplication

1. **Identify similar programs in the State and/or the same geographical area. Discuss similarities and differences between the proposed program and others in the same degree to be awarded.**
   There are no masters degrees specifically based on Cyber Science Education in Maryland. The proposed Master of Science in Education in Cyber Science would be the first. If approved, Capitol Technology University's Master of Science in Education in Cyber Science will position its graduates to fill the requirement for mid-level and senior leaders and top experts in Cyber Science education in Maryland and the United States, plus allied nations.

2. **Provide justification for the proposed program.**
   The proposed **Master of Education in Cyber Science** program is strongly aligned with the University's strategic priorities and is supported by adequate resources. The proposed **Master of Education in Cyber Science** degree will strengthen and expand upon the existing technology, management, and applied engineering degree programs at the University. In addition, the **Master of Education in Cyber Science** program will be an option for all students as the field integrates well with the market needs of the University's other programs. There is a thorough discussion of the need for the program in Sections B and C of this document.

DI. Relevance to high-demand programs at Historically Black Institutions (HBIs):

1. **Discuss the program's potential impact on the implementation or maintenance of high-demand programs at HBIs.**
   The University does not anticipate any impact on the implementation or maintenance of high-demand programs at HBIs. There are no masters programs, or other masters degrees, in Cyber Science in Maryland or the rest of the United States. The proposed **Master of Education in Cyber Science** would be the first.

DII. Relevance to the identity of Historically Black Institutions (HBIs):

1. **Discuss the program's potential impact on the uniqueness and institutional identities and missions of HBIs.**

   The University does not anticipate any impact on the uniqueness and institutional identities and missions of HBIs. There are no masters programs, or other masters degrees, in Education in Cyber Science in Maryland or the rest of the United States. The proposed Master of Education in Cyber Science would be the first.

G. Adequacy of Curriculum Design, Program Modality, and Related Learning Outcomes (as outlined in COMAR 13B.02.03.10):

1. **Describe how the proposed program was established, and also describe the Faculty who will oversee the program.**

   The University's New Programs Group established the proposed program through a rigorous review of unmet needs. The group includes selected representation from the University's Faculty, administrators, and Executive Council. Please see Section I for a detailed list of the Faculty's backgrounds and qualifications.

2. **Describe educational objectives and learning outcomes appropriate to the rigor, breadth, and (modality) of the program.**

   Learning Objectives:

   1. Students will demonstrate advanced knowledge and competencies in evaluating pedagogy for delivering Cyber Science curriculum
   2. Students will demonstrate advanced knowledge and competencies to contribute research to the Cyber Science body of knowledge.
   3. Students will analyze theories, tools, and frameworks used in Cyber Science curriculum development, delivery and assessment
   4. Students will synthesize ethical aspects into Cyber Science curriculum.
   5. Students will execute a plan to complete a significant piece of scholarly work in Cyber Science.
   6. Students will evaluate and recommend technologies required to deliver cutting edge Cyber Science curriculum.

   Learning Outcomes:

   Upon graduation, graduates will be able to :

   1. Evaluate and apply educational and cybersecurity theories to the issues of policy and practice of cyber science
   2. Utilize best practices in curriculum design and assessment to develop cyber science curriculum for all levels of education
   3. Effectively communicate research findings via written and oral mediums
   4. Design and conduct original research studies exploring the linkages between pedagogy and Cyber Science and their impact on the educational landscape

Explain how the institution will:

a) Provide for assessment of student achievement of learning outcomes in the program

Capitol Technology University will assess student achievement of the learning outcomes per the regulations specified by the University's regional accreditation organization: the Middle States Commission on Higher Education (MSCHE).

Under MSCHE, the University will use Standard V, Educational Effectiveness Assessment, of the Standards for Accreditation and Requirements of Affiliation. Standard V requires:

> Assessment of student learning and achievement demonstrates that the institution's students have accomplished educational goals with their program of study, degree level, the institution's mission, and appropriate expectations for institutions of higher education.
>
> (Source: https://www.msche.org/standards/, retrieved 7/22/2019)

Per the MSCHE's accreditation requirements, Capitol Technology University will measure Standard V by using the following criteria:

> An accredited institution possesses and demonstrates the following attributes or activities:
>
> 1. [C]learly stated educational goals at the institution and degree/program levels, which are interrelated with one another, with relevant educational experiences, and with the institution's mission;
>
> 2. [O]rganized and systematic assessments, conducted by faculty and/or appropriate professionals, evaluating the extent of student achievement of institutional and degree/program goals. Institutions should:
>
> > a. define meaningful curricular goals with defensible standards for evaluating whether students are achieving those goals;
> >
> > b. articulate how they prepare students in a manner consistent with their mission for successful careers, meaningful lives, and, where appropriate, further education. They should collect and provide data on the extent to which they are meeting these goals;
> > c. support and sustain assessment of student achievement and communicate the results of this assessment to stakeholders;
>
> 3. [C]onsideration and use of assessment results for the improvement of educational effectiveness. Consistent with the institution's mission, such uses include some combination of the following:
>
> > a. assisting students in improving their learning;
> > b. improving pedagogy and curriculum;
> > c. reviewing and revising academic programs and support services;
> > d. planning, conducting, and supporting a range of professional development activities;

e. planning and budgeting for the provision of academic programs and services;
f. informing appropriate constituents about the institution and its programs;
g. improving key indicators of student success, such as retention, graduation, transfer, and placement rates;
h. implementing other processes and procedures designed to improve educational programs and services;

4. [I]f applicable, adequate and appropriate institutional review and approval of assessment services designed, delivered, or assessed by third-party providers; and

5. [P]eriodic assessment of the effectiveness of assessment processes utilized by the institution for the improvement of educational effectiveness.

(Source: http://www.msche.org/wp-content/uploads/2018/06/RevisedStandardsFINAL.pdf)

The University will also evaluate student achievement of the learning outcomes using the Quality Assurance Agency for Higher Education (QAA) Framework for Higher Education Qualifications and its related assessment tools. The following tables provide a high-level view of the QAA Qualification Frameworks for doctoral programs:

QAA Qualifications Framework for Ph.D.

4.18 Descriptor for a higher education qualification at level 8 on the FHEQ and SCQF level 12 on the FQHEIS: doctoral degree

The descriptor provided for this level of the frameworks is for any doctoral degree which should meet the descriptor in full. This qualification descriptor should also be used as a reference point for other level 8/level 12 qualifications.

Doctoral degrees are awarded to students who have demonstrated:

- the creation and interpretation of new knowledge, through original research or other advanced scholarship, of a quality to satisfy peer review, extend the forefront of the discipline, and merit publication
- a systematic acquisition and understanding of a substantial body of knowledge which is at the forefront of an academic discipline or area of professional practice
- the general ability to conceptualise, design and implement a project for the generation of new knowledge, applications or understanding at the forefront of the discipline, and to adjust the project design in the light of unforeseen problems
- a detailed understanding of applicable techniques for research and advanced academic enquiry.

Typically, holders of the qualification will be able to:

- make informed judgements on complex issues in specialist fields, often in the absence of complete data, and be able to communicate their ideas and conclusions clearly and effectively to specialist and non-specialist audiences
- continue to undertake pure and/or applied research and development at an advanced level, contributing substantially to the development of new techniques, ideas or approaches.

And holders will have:

- the qualities and transferable skills necessary for employment requiring the exercise of personal responsibility and largely autonomous initiative in complex and unpredictable situations, in professional or equivalent environments.

QAA Qualifications Framework for Ph.D. (Continued)

4.18.1 Doctoral degrees are awarded for the creation and interpretation, construction and/or exposition of knowledge which extends the forefront of a discipline, usually through original research.

4.18.2 Holders of doctoral degrees are able to conceptualise, design and implement projects for the generation of significant new knowledge and/or understanding. Holders of doctoral degrees have the qualities needed for employment that require both the ability to make informed judgements on complex issues in specialist fields and an innovative approach to tackling and solving problems.

4.18.3 Doctoral programmes that may have a substantial taught element in addition to the research component (for example, professional doctorates), lead usually to awards which include the name of the discipline in their title (for example, EdD for Doctor of Education or DClinPsy for Doctor of Clinical Psychology). Professional doctorates aim to develop an individual's professional practice and to support them in producing a contribution to (professional) knowledge.

4.18.4 The titles PhD and DPhil are commonly used for doctoral degrees awarded on the basis of original research.

4.18.5 Achievement of outcomes consistent with the qualification descriptor for the doctoral degree normally requires study equivalent to three full-time calendar years.

4.18.6 Higher doctorates may be awarded in recognition of a substantial body of original research undertaken over the course of many years. Typically a portfolio of work that has been previously published in a peer-refereed context is submitted for assessment. Most degree awarding bodies restrict candidacy to graduates or their own academic staff of several years' standing.

(Source: UK Quality Code for Higher Education, Part A: Setting and Maintaining Academic Standards, The Frameworks for Higher Education Qualifications of UK Degree-Awarding Bodies, October 2014)

3. Provide a list of courses with title, semester credit hours and course descriptions, along with a description of program requirements.

Program description, as it will appear in the catalog:

The **Master of Education in Cyber Science** degree is a unique program designed to meet the long-standing needs of today's Cyber industry. The **Master of Education in Cyber Science** program provides students with the opportunity to conduct extensive and sustained, original research at the highest level in the field. The **Master of Education in Cyber Science i**s designed to meet the demands of the highest-skilled professionals to become leaders who will be involved in the advancement, expansion and support of the **Master of Education in Cyber Science** environment on a large and small scale. The **Master of Education in Cyber Science** is for current professionals in the field who desire to elevate their skills to the highest level and to contribute to the body of knowledge in Cyber Science in all of the Nations Industries.

The proposed **Master of Education in Cyber Science** degree is for current professionals in the field. The degree provides a path for Cyber professionals to explore new ground in the critical field of Cyber Science. The University is uniquely positioned to give those students an avenue to pursue a deep proficiency in this area using an interdisciplinary methodology, cutting-edge courses, and dynamic Faculty. Graduates will contribute significantly to the Cyber Science field by creating new knowledge and ideas. The **Master of Education in Cyber Science** program is designed as a doctorate by research where students can quickly engage in leadership, research, and publishing.

Description of program requirements:

Entrance Requirements

To be accepted into the **Master of Education in Cyber Science** program, students must have completed an appropriate bachelors's degree with a cumulative GPA of no less than 3.0 on a 4.0 scale. Students must also possess a high level of experience in the field, or a closely related field, and show the academic promise of their future ability to produce original research of publishable quality (suitable for a scholarly peer-reviewed journal or publication and presentation of high stature). The Dean of doctoral Programs will make individual decisions on a case-by-case basis at the application stage.

Students must also provide a prospectus of at least 1000 words that details their existing expertise and preparation for success in conducting original research within Capitol Technology University's **Master of Education in Cyber Science** program. International students are required to take the TOEFL and score at least 550 on the paper-based test or 79 on the internet-based test if there Master's degree was not from a University where it was taught in English.

Degree Requirements:

The **Master of Education in Cyber Science** program is designed for students with an appropriate bachelor's degree and significant years of field experience. During the program, students will conduct original research in an approved area of study. Successful completion of the program culminates in the award of the **Master of Education in Cyber Science** degree.

There is one option for completion of the **Master of Education in Cyber Science** program. The student will produce, present, and defend a thesis after receiving the required approvals from the student's Committee and the Masters Institutional Review Board. The student will produce, present, and defend their original thesis after receiving the required approvals from the student's Committee and the Masters Institutional Review Board.

Degree Requirements:

The following is a list of courses for the **Master of Education in Cyber Science** degree. Students expecting to complete this degree must meet all prerequisites for the courses listed below.

Master of Education in Cyber Science Courses
Total Credits: 33

CYBER SCIENCE MASTERS CORE COURSES: 18 CREDITS

IAE-685 Principles of Cybersecurity (3 credits)
This class explores the overarching security architectures and vectors of information assurance from a management perspective to allow the learner to formulate the basis for sound business decisions. Students gain an appreciation for systems, networks, processes, methodologies, documentation requirements, recovery processes, certification and accreditation processes as well as "best practice" implementation, training and continuous improvement. Discussions in this course give the correct acumen of personnel security, physical security, and technical operational security as these principles relate and interface with information security principles.

Defense-in-depth principles also are covered for designing proper physical security programs. At the completion of the course students should be able to manage an IA function and evaluate an organization's Contingency Planning process for adequacy. (3).

CS-620 Operating System Principles for Information Assurance (3 Credits)
This course is an overview of the UNIX operating system. The content will include shell programming, process management, processor management, storage management, scheduling algorithms, resource protection and system programming. The course will include programming projects focused on Information Assurance problem solving utilizing the C programming language primarily. Students are expected to be familiar with virtual machines, the UNIX command line and a basic programming language. Basic knowledge of C programming and UNIX helpful. (3) Note: This course is not an approved elective for the MS in Computer Science program.

IAE-671 Legal Aspects of Computer Security and Information Privacy (3 Credits)
This course provides an overview of the legal rights and liabilities associated with operation and use of computers and information, including the legal and regulatory compliance issues critical for chief information security officers. It discusses the key statutes, regulations, treaties, and court cases (in the United States and abroad) that establish legal rights and responsibilities as to computer security and information privacy. The course also helps students to learn how to reduce their risk of potential legal liability for computer security or information privacy failures, and how to enforce their security and privacy rights against other parties. Case studies and lessons learned from information security failures are used throughout the course. (3)

IAE-684 Complementary Security (CISSP) (3 credits)
Complementary Security is best defined as taking holistic, defense-in-depth approach to designing a complete Information Security Program. In the course, students will learn how individual domains of security from the (ISC)2 CISSP Common Book of Knowledge work together to properly address cyber risks within an organization. At the end of the course, students will be able to: (a) utilize industry best practices and frameworks to design a complete and customizable Information Security Program for any organization; (b) understand how to manage the program from an executive (CISO) level; (c) and have the knowledge necessary to take the CISSP exam. Prerequisite: IAE-685 (3)

MCS-645 Pedagogy in Cyber Science (6 credits)
Learners are introduced to the fundamentals of teaching cyber science. Learners gain experience in course and syllabus development. The development and integration of online labs as an academic component is explored. Learners examine the professional development and training that supports science. *This course is cross listed with ECS-830* (6)

CYBER SCIENCE MASTERS
RESEARCH AND WRITING: 18 CREDITS

MCS-700 Fundamentals of Graduate Research & Design (6 credits)
This course will introduce the fundamentals of graduate research and design. The project will focus on graduate level writing, APA style, and the fundamentals of scientific inquiry. The project will cover the areas of technology research, ethics of research, the stages of the research process, conceptualization and operationalization of research questions, data collection

techniques, analytics, an introduction to qualitative and quantitative methods and measurement, a discussion of program evaluation research, and research proposal development. (6)

MCS -725 Cyber Science Research & Data Collection (6 credits)
The student will produce a proposal for research that is comprehensive in detail and planning. The proposal will address the research topic, scope and aims, objectives and include a timing plan. The student will then complete the research milestones according to the proposal and research plan. The IRB will need to be completed by this stage.(6)

MCS -735 Cyber Science Thesis and Defense (6 credits)
Upon approval from the University Reviewers and Review Board, the student will prepare and deliver an oral presentation summarizing the body of research and defend the same through viva voce (i.e., oral examination). The student's Chair, Committee and Review Board will confer to determine if the student has provided a sufficient and necessary final oral defense of the research. (6)

There are no prerequisites, the maximum number of courses per semester is two, unless approved by the VPAA under exception when it is shown the student may commit sufficient time for the planned work.

4. **Discuss how general education requirements will be met, if applicable.**

   N/A. This is a graduate program.

5. **Identify any specialized accreditation or graduate certification requirements for this program and its students.**
   The program will be accredited regionally by Middle States Commission on Higher Education (MSCHE). The University will also evaluate student achievement of the learning outcomes using the UK Quality Assurance Agency for Higher Education (QAA) Framework for Higher Education Qualifications.

6. **If contracting with another institution or non-collegiate organization, provide a copy of the written contract.**

   The University will not be contracting with another institution or non-collegiate organization.

7. **Provide assurance and any appropriate evidence that the proposed program will provide students with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/student interaction, assumptions about technology competence and skills, technical equipment requirements, learning management system, availability of academic support services and financial aid resources, and costs and payment policies.**
   The **Master of Education in Cyber Science** program will provide students with clear, complete, and timely information on the curriculum, course and degree requirements, nature of faculty/ student interaction, assumptions about technology competence and skills, technical equipment requirements, Learning Management System, availability of academic support services and financial aid resources, and costs and payment policies.

Curriculum, course, and degree information will be available on the university website and via e-mail as well as regular mail (by request). The expectations for faculty/student interaction are available to students during virtual open house events, literature, website, etc. This information is also part of the material distributed for each course. Students receive guidance on proper behavior/interaction with their Department Chair and faculty members both in-person and online to facilitate a high-level experience. Technology competence and skills and technical equipment requirements are part of the material distributed for each course. The technical equipment requirements are also listed on our website and provided to students in the welcome package.

The University's academic support services, financial aid resources, costs and payment policies, and Learning Management System are covered in the University Open Houses, the application process, the Welcome Aboard process, Orientation, Student Town Halls, and individual counseling.

8. **Provide assurance and any appropriate evidence that advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and the services available.**

   The **Master of Education in Cyber Science** program's advertising, recruiting, and admissions materials will clearly and accurately represent the proposed program and the services available. The content for every new program is derived from the new program request sent to the Maryland Higher Education Commission is the source of the content for every new program at the University.

H. Adequacy of Articulation:

1. **If applicable, discuss how the program supports articulation with programs at partner institutions. Provide all relevant articulation agreements.**

   This program does not currently have articulation partners. However, the articulation process will work as it does for the University's current degrees. The University is very active with its transfer partners throughout the state and beyond. The goal of the University is to work with partners to make the transfer as seamless as possible and to maximize the student's transfer credits as possible. There are University transfer admissions personnel to guide the student through the process.

I. Adequacy of Faculty Resources (as outlined in COMAR 13B.02.03.11):

1. **Provide a brief narrative demonstrating the quality of the program faculty. Include a summary list of the Faculty with appointment type, terminal degree title and field, academic title/rank, status (full-time, part-time, or adjunct) and the course(s) each faculty member will teach.**

   Almost all of the Faculty listed below have been engaged with the University for at least several years. Dr. Baker, Dr. Butler, Dr. Charles, Dr. Conner and Dr. McAndrew are fulltime faculty members. All of the faculty members hold terminal degrees. The University leadership is confident in the quality of the Faculty and their abilities to provide a learning environment that supports the university's goals for student success. Additional Ph.D.-qualified Faculty will be added as needed.

Instructors who will be engaged with the M.S.**Ed. in Cyber Science** are:

Dr. Richard Baker Full time	Ph.D. Information Systems M.S. Computer Science B.S. Mathematics	MCS 700 courses
Dr. Malcolm Beckett Adjunct	D.B.A. Quality Systems Management in Homeland Security and Defense M.S. Information Systems Management B.S. Criminal Justice CISSP PMP	MCS 725 & 735 courses
Dr. William Butler Full-time	D.Sc. Cyber Security M.S. Telecommunications Management M.S. Strategic Studies B.S. Computer Science NSTISSI No. 4011 CNSSI No. 4012 NSTISSI No. 4015 CNSSI No. 4016	MCS-845
Dr. Kellep Charles Full-time	D.Sc. Cyber Security M.S. Telecommunications Management B.S. Computer Science CISSP	IAE-685, CS-620, IAE-671, IAE-684
Dr. Charles Conner Full time	Ph.D. Electrical Engineering M.S. Electrical Engineering B.S. Electrical Engineering	MCS 700 courses
Dr. Ian McAndrew Full time	Ph.D. Mechanical Engineering M.Sc. Manufacturing Engineering M.A. Education Management Post-Graduate Diploma in Education B.Sc. (Hons) Mechanical Engineering B.A. Production Engineering Technical Qualifications (Associate Degrees) Higher National Certificate, HNC, in Mechanical Engineering Higher National Diploma, HND, in Production Engineering	MCS 700 courses
Dr. Angel Clay Instructional Design Full time	Doctor of Education (Ed.D.) M.A. B.A.	MCS-845
Mr. William Drayton Instructional Design Full time	MS Education / Curriculum Design BA Social Psychology	MCS-845

Dr Kellep Charles.

Dr. Kellep Charles (@kellepc) completed his Doctorate in Cybersecurity at Capitol Technology University. He also holds a Master of Science in Telecommunication Management from the University of Maryland University College and a Bachelor of Science in Computer Science from North Carolina Agricultural and Technical State University. Dr. Charles worked as a government contractor in the Washington, DC area as an information security analyst for over 20 years in the areas of incident response, computer forensics, security assessments, malware analysis, and security operations. He is the creator and executive editor of SecurityOrb.com (@SecurityOrb), an information security & privacy knowledge-based website with the mission to share and raise awareness of the motives, tools, and tactics of the black-hat community, and provide best practices and countermeasures against malicious events.

Dr. Charles has appeared and made regular contributions to local media outlets such as PGCTV, WPGC 95.5 FM, Politc365.com, WPFW 89.3, and Examiner.com to discuss technology, security, and privacy matters. He has served as an adjunct professor at Capitol Technology University since 2001in their computer science & cybersecurity departments. His industry certifications include Certified Information Systems Security Professional (CISSP), Cisco Certified Network Associate (CCNA), Certified Information Systems Auditor (CISA), National Security Agency – INFOSEC Assessment Methodology (NSA-IAM), and Information Technology Infrastructure Library version 3 (ITILv3) among others. Dr. Charles serves as a professor, Director of Cyber Labs, and Director of Center for Cybersecurity Research and Analysis (CCRA) for Capitol Technology University's Cybersecurity department. He is Chair of Cybersecurity programs at the university and active in all education issues related to Cyber.

2. Demonstrate how the institution will provide ongoing pedagogy training for Faculty in evidence-based best practices, including training in:

a) Pedagogy that meets the needs of the students

The primary pedagogy for Faculty at Capitol Technology University is the Active Learning model. The university believes strongly in a highly interactive, thinking, and hands-on experience for students in each class to the maximum extent possible.

> It was two Missouri State professors, historian Charles Bonwell and psychologist James Eison, who coined the term "active learning." In their 1991 book on the subject, Active Learning: Creating Excitement in the Classroom, they offered this definition of the concept: "active learning involves students in doing things and thinking about the things they are doing."
>
> The definition, though it seems circuitous, marks a definitive pedagogical shift in college teaching and learning. Rather than think about what they are watching, hearing, or reading, students are first encouraged to be "doing" something in class, and then to apply critical thought and reflection to their own classroom work and activity. Their argument was backed up by research. Even Bligh, 20 years earlier, had pointed out that the immediate rehearsal of new information and knowledge had a significant impact on learning.
>
> This approach is as helpful in the sciences as it is in the arts or humanities: whether it's organic chemistry, creative writing, or behavioral economics, concepts are all best understood through repeated practice and open, social exploration. The central tenet of

> active learning is that practice matters, and that classroom time is better spent giving students opportunities to work with concepts over and over, in a variety of ways and with opportunities.
>
> The central tenet of active learning — that practice and interaction matters— can be applied across disciplines for immediate feedback, so that knowledge can take hold in their own minds.
>
> (Source: Preville, P. Active Learning: The Perfect Pedagogy for the Digital Classroom: An Essential Guide for the Modern Professor)

All Faculty receive regular periodic and recurring pedagogical training during the academic year. Those training sessions occur in a hybrid format – simultaneously live online and live on-ground in the classroom. The sessions are designed to reach all Faculty, both fulltime and adjunct, in order to ensure everyone receives the training. Additionally, the sessions are recorded for those Faculty who are unable to attend the live training session due to other professional and teaching commitments.

b) The Learning Management System

The University's Department of Online Learning and Information Technology Division supports the online program needs of Faculty and students. The Department of Online Learning and IT Help Desk provide 24-hour support to the Faculty. Canvas is the University's online Learning Management System. When a new faculty member is assigned to teach an online course, the Department of Online Learning provides formal training for the instructor. New Faculty are assigned an experienced faculty mentor to ensure a smooth transition to the online environment as well as to ensure compliance with the institution's online teaching pedagogy. The University believes this provides the highest-level learning experience for the faculty member and, in turn, students attending online classes.

c) Evidenced-based best practices for distance education, if distance education is offered.

Faculty at Capitol Technology University receive training in Keller's ARCS Motivational Model and his associated strategies for distance education/online learning.

> A model used in the online delivery of teaching and learning to increase learner motivation is Keller's ARCS motivational model. This model has been considered an important element in online education because of its implications on increased learner motivation and learning outcomes. The Keller's model consists of motivating students by maintaining and eliciting attention (A), such as virtual clinical simulations; making the content and format relevant (R), by modeling enthusiasm or relating content to future use; facilitating student confidence (C), by providing "just the right challenge"; and promoting learner satisfaction (S), by providing reinforcement and praise when appropriate. Examples of Keller's model include increasing motivation including the arousal of curiosity of students, making the connection between learning objectives and future learning goals, autonomous thinking and learning, and fostering student satisfaction. Keller's ARCS model has been researched by various educational online programs to analyze student motivation and learning outcomes. Keller's model serves as an example

and guide for instructors to motivate and increase online engagement with their students as wells as research purposes.

A qualitative study by Chan Lin investigated online student learning and motivation. Discussion boards, student projects, and reflection data were collected and analyzed from a 12-week web-based course. Respondents indicated the importance of online feedback from the instructor and peer modeling of course tasks to visualize learning progress. The study revealed using Keller's ARCS strategies fosters greater student online engagement by fostering self-efficacy and a sense of accomplishment.

In a mixed-method study, assessing the use of Keller's ARCS on instructional design, the use of educational scaffolding fostered positive levels of student motivation. Relevancy, attention, confidence, and satisfaction were all common factors associated with student success in the course and course completion.

(Source: Pinchevsky-Font T, Dunbar S. Best Practices for Online Teaching and Learning in Health Care Related Programs. The Internet Journal of Allied Health Sciences and Practice. January 2015. Volume 13 Number 1.)

All Faculty receive regular periodic and recurring training on evidence-based practices for distance education/online learning during the academic year. Those training sessions occur in multiple formats: asynchronous, synchronous (i.e., live online), hybrid (i.e., simultaneously live online and live on-ground), and on-ground in the classroom. The sessions are designed to reach all Faculty, both fulltime and adjunct, to ensure all members receive the training. Additionally, the live sessions are recorded for those Faculty who are unable to attend the live training session due to other professional commitments or who are teaching classes at the training delivery time.

J. Adequacy of Library Resources (as outlined in COMAR 13B.02.03.12):

1. **Describe the library resources available and/or the measures to be taken to ensure resources are adequate to support the proposed program. If the program is to be implemented within existing institutional resources, include a supportive statement by the President for library resources to meet the program's needs.**

Library Services: The Puente Library offers extensive services and a wide collection for Capitol Technology University students to be academically successful. Library resources are available digitally. The library also provides a mailing service for materials borrowed through the Maryland system.

The library is currently supporting the following degrees at the undergraduate level: B.S. in Astronautical Engineering, B.S. in Aviation Professional Pilot, B.S. in Computer Engineering, B.S. in Computer Engineering Technology, B.S. in Computer Science, B.S. in Construction Information Technology and Cybersecurity, B.S. in Construction Management and Critical Infrastructure, B.S. in Construction Safety, B.S. in Cyber Analytics, B.S. in Cybersecurity, B.S. in Data Science, B.S. in Electrical Engineering, B.S. in Electrical Engineering Technology, B.S. in Engineering Technology, B.S. in Facilities Management and Critical Infrastructure, B.S. in Information Technology, B.S in Management of Cyber and Information Technology, B.S. in Mechatronics Engineering, B.S. in Mechatronics and Robotics Engineering Technology, B.S. in

Software Engineering, and B.S. in Technology and Business Management, B.S in Unmanned and Autonomous Systems, and B.S. in Web Development.

The library is currently supporting the following degrees at the graduate level: Master of Business Administration (M.B.A.), Master of Science (M.S.) in Astronautical Engineering, M.S. in Aviation, M.S. in Aviation Cybersecurity, M.S. in Computer Science, M.S. in Construction Cybersecurity, M.S. in Construction Safety, M.S. in Critical Infrastructure, M.S. in Cyber Analytics, M.S. in Cybersecurity, M.S. in Information Systems Management, M.S. in Engineering Technology, M.S. in Internet Engineering, M.S. in Unmanned and Autonomous Systems Policy and Risk Management, Technical Master of Business Administration (T.M.B.A.) in Business Analytics and Data Science, and T.M.B.A. in Cybersecurity, Doctor of Science (D.Sc.) in Cybersecurity, Doctor of Philosophy (Ph.D.) in Artificial Intelligence, Ph.D. in Aviation, Ph.D. in Business Analytics and Data Sciences, Ph.D. in Construction Science, Ph.D. in Critical Infrastructure, Ph.D. in Emergency and Protective Services, Ph.D. in Human Factors, Ph.D. in Manufacturing, Ph.D. in Occupational Health and Safety, Ph.D. in Product Management, Ph.D. in Quantum Computing, Ph.D. in Technology, Ph.D. in Technology/M.S. Research Methods Combination Program, Ph.D. in Unmanned Systems Applications.

Therefore, the library is fully prepared to support a **Master of Education in Cyber Science.**

Services provided to online students include:

- "Ask the Librarian"
- Research Guides
- Tutorials
- Videos
- Online borrowing

The John G. and Beverley A. Puente Library provides access to management, decision science, and research methods materials through its 10,000-title book collection, e-books, and its 90 journal subscriptions. The library will continue to purchase new and additional materials in the management, decision science, and research methods area to maintain a strong and current collection in the subject area. Students can also access materials through the library's participation in Maryland's Digital eLibrary Consortium. This online electronic service provides access to numerous databases (Access Science, NetLibrary) that supply students with the documents they need. Available databases include ProQuest, EBSCO, ACM, Lexis Nexis, Taylor Francis, and Sage Publications.

The Puente Library can provide access to historical management and decision science materials through its membership in the Maryland Independent College and University Association (MICUA) and the American Society of Engineering Education (ASEE). Reciprocal loan agreements with fellow members of these organizations provide the library access to numerous research facilities that house and maintain archives of management and decision science documents. The proximity of the University of Maryland, College Park, and other local area research and academic libraries provide the Puente Library with quick access to these materials as well.

The library currently supports the needs of students at the undergraduate, masters, and doctoral levels.

K. Adequacy of Physical Facilities, Infrastructure and Instructional Equipment (as outlined in COMAR 13B.02.03.13):

1. Provide an assurance that the physical facilities, infrastructure, and instruction equipment are adequate to initiate the program, particularly as related to spaces for classrooms, staff and Faculty offices, and laboratories for studies in the technologies and sciences. If the program is to be implemented within existing institutional resources, include a supportive statement by the President regarding adequate equipment and facilities to meet the program's needs.

No new facilities are required for the program. The online class platform is web-based and requires no additional equipment for the institution. The current Learning Management System, Canvas, and Zoom meet the needs of the degree program. The Business and Technology Lab, Computer Science Lab, Cyber Lab, Robotics Lab, and Unmanned Systems Lab meet the potential research needs of the students. The labs provide both local and virtual support.

2. Provide assurance and any appropriate evidence that the institution will ensure students enrolled in and faculty teaching in distance education will have adequate access to:

a. An institutional electronic mailing system

Capitol Technology University provides an institutional electronic mailing system to all students and Faculty. The University requires the use of the email system by all students and Faculty in all the institution's modalities of course delivery. Capitol Technology University students and Faculty are required to use the institution's email addresses (e.g., xxxxxxxx@captechu.edu) in all University matters and communications. The University uses the email capabilities in Microsoft Office 365 and Microsoft Outlook.

b. A Learning Management System that provides the necessary technological support for distance education

Capitol Technology University provides a robust Learning Management Systems (LMS) through the use of the Canvas LMS by Instructure (www.canvaslms.com). The University pairs Canvas with Zoom (zoom.us) to provide a platform for every student and faculty member to meet face-to-face in a synchronous "live" mode of communication. The University requires Canvas for every class; as a result, every course has a classroom on Canvas and Zoom. All syllabi, grades, and assignments must be entered into Canvas on a timely basis throughout the semester.

Canvas provides the world's most robust LMS. It is a 21st Century LMS; Canvas is a native cloud, Amazon Web Service hosted system. The system is adaptable, reliable, and customizable. Canvas is easy to use for students and Faculty. The system is fully mobile and has proven to be timesaving when compared to other systems. The following list provides the features of the system:

<u>Time and Effort Savings</u>

- CANVAS DATA
  Canvas Data parses and aggregates more than 280 million rows of Canvas usage data generated daily.
- CANVAS COMMONS
  Canvas Commons makes sharing a whole lot easier.
- SPEEDGRADER ANNOTATIONS
  Preview student submissions and provide feedback all in one frame.
- GRAPHIC ANALYTICS REPORTING ENGINE
  Canvas Analytics helps you turn rich learner data into meaningful insights to improve teaching and learning.
- INTEGRATED MEDIA RECORDER
  Record audio and video messages within Canvas.
- OUTCOMES
  Connect each learning outcome to a specific goal, so results are demonstrated in clearly measurable ways.
- MOBILE ANNOTATION
  Open, annotate, and submit assignments directly within the Canvas mobile app.
- AUTOMATED TASKS
  Course management is fast and easy with automated tasks.
- NOTIFICATION PREFERENCES
  Receive course updates when and where you want - by email, text message, even Twitter or LinkedIn.
- EASE OF USE
  A familiar, intuitive interface means most users already have the skills they need to navigate, learn, and use Canvas.
- IOS AND ANDROID
  Engage students in learning anytime, anywhere from any computer or mobile device with a Web-standard browser.
- USER-CUSTOMIZABLE NAVIGATION
  Canvas intelligently adds course navigation links as teachers create courses.
- RSS SUPPORT
  Pull feeds from external sites into courses and push out secure feeds for all course activities.
- DOWNLOAD AND UPLOAD FILES
  Work in Canvas or work offline—it's up to you.
- SPEEDGRADER
  Grade assignments in half the time.

<u>Student Engagement</u>

- ROBUST COURSE NOTIFICATIONS
  Receive course updates when and where you want—by email, text message, and even Facebook.

- PROFILE
  Introduce yourself to classmates with a Canvas profile.

- AUDIO AND VIDEO MESSAGES
  Give better feedback and help students feel more connected with audio and video messages.

- MULTIMEDIA INTEGRATIONS
  Insert audio, video, text, images, and more at every learning contact point.

- EMPOWER GROUPS WITH COLLABORATIVE WORKSPACES
  By using the right technologies in the right ways, Canvas makes working together easier than ever.

- MOBILE
  Engage students in learning anytime, anywhere from iOS or Android, or any mobile device with a Web-standard browser.

- TURN STUDENTS INTO CREATORS
  Students can create and share audio, video, and more within assignments, discussions, and collaborative workspaces.

- WEB CONFERENCING
  Engage in synchronous online communication.

- OPEN API
  With its open API, Canvas easily integrates with your IT ecosystem.

- BROWSER SUPPORT
  Connect to Canvas from any Web-standard browser.

- LTI INTEGRATIONS
  Use the tools you want with LTI integrations.

- MODERN WEB STANDARDS
  Canvas is built using the same Web technologies that power sites like Google, Facebook, and Twitter.

<u>Lossless Learning</u>

- CANVAS POLLS
  Gauge comprehension and incorporate formative assessment without the need for "clicker" devices.

- MAGICMARKER
  Track in real-time how students are performing and demonstrating their learning.

- QUIZ STATS
  Analyze and improve individual assessments and quiz questions.

- LEARNING MASTERY FOR STUDENTS
  Empower students to take control of their learning.

(Source: https://www.canvaslms.com/higher-education/features)

Capitol Technology University has been using Canvas for over five years. Canvas has proven to be a wholly reliable LMS system that provides the necessary technological support for distance education/online learning.

L. Adequacy of Financial Resources with Documentation (as outlined in COMAR 13B.02.03.14):

1. **Table 1: Resources.**

TABLE 1: RESOURCES

Resource Categories	Year 1	Year 2	Year 3	Year 4	Year 5
1. Reallocated Funds	$0	$0	$0	$0	$0
2. Tuition/Fee Revenue (c + g below)	$201,528	$309,744	$493,416	$649,944	$851,184
a. Number of F/T Students	0	0	0	0	0
b. Annual tuition/Fee rate	$0	$0	$0	$0	$0
c. Total F/T Revenue (a x b)	$0	$0	$0	$0	$0
d. Number of P/T Students	12	18	28	36	46
e. Credit Hour Rate	$933	$956	$979	$1,003	$1,028
f. Annual Credit Hour	18	18	18	18	18
g. Total P/T Revenue (d x e x f)	$201,528	$309,744	$493,416	$649,944	$851,184
3. Grants, Contracts and Other External Sources	0	0	0	0	0
4. Other Sources	0	0	0	0	0
TOTAL (Add 1 – 4)	$201,528	$309,744	$493,416	$649,944	$851,184

A. Provide a narrative rationale for each of the resource categories. If resources have been or will be reallocated to support the proposed program, briefly discuss those funds.

1. **Reallocated Funds**
   The University will not need to reallocate funds for the program.
2. **Tuition and Fee Revenue**
   Tuition is calculated to include an annual 2.5% tuition increase. A 20% attrition rate has been calculated.
3. **Grants and Contracts**
   There are currently no grants or contracts.
4. **Other Sources**
   There are currently no other sources of funds.
5. **Total Year**
   No additional explanation or comments needed.

2. Table 2: Program Expenditures.

TABLE 2: EXPENDITURES

Expenditure Category	Year 1	Year 2	Year 3	Year 4	Year 5
1. Faculty (b + c below)	$113,468	$155,071	$238,421	$325,843	$417,486
a. #FTE	1.5	2	3	4	5
b. Total Salary	$94,557	$129,226	$198,684	$271,536	$347,905
c. Total Benefits (20% of salaries)	$18,911	$25,845	$39,737	$54,307	$69,581
2. Admin Staff (b + c below)	$5,942	$6,091	$6,244	$6,400	$6,559
a. #FTE	.08	.08	.08	.08	.08
b. Total Salary	$4,952	$5,076	$5,203	$5,333	$5,466
c. Total Benefits	$990	$1,015	$1,041	$1,067	$1,093
3. Support Staff (b + c below)	$59,885	$92,076	$125,837	$161,230	$198,313
a. #FTE	1.00	1.5	2	2.5	3
b. Total Salary	$49,905	$76,730	$104,864	$134,358	$165,261
c. Total Benefits	$9,980	$15,346	$20,973	$26,872	$33,052
4. Technical Support and Equipment	$840	$1,425	$2,320	$3,145	$4,140
5. Library	$0	$0	$0	$0	$0
6. New or Renovated Space	$0	$0	$0	$0	$0
7.Other Expenses	$5,850	$14,210	$25,370	$39,330	$56,090
TOTAL (ADD 1-7)	$185,985	$268,873	$398,192	$535,948	$682,588

A. Provide a narrative rationale for each expenditure category. If expenditures have been or will be reallocated to support the proposed program, briefly discuss those funds.

a. Faculty
Table 2 reflects the faculty hours in total, but this does not necessarily imply that these are new hire requirements.

b. Administrative Staff
Capitol Technology University will continue with current the administrative staff through the proposed time period.

c. Support Staff
Capitol Technology University will add additional support staff to facilitate the program.

d. Equipment
Software for courses is available free to students or is freeware. Additional licenses for the LMS will be purchased by the University at the rate of $70 per student in Year 1. The rate is estimated to increase by $5 per year.

e. Library
Money has been allocated for additional materials to be added to the on-campus and virtual libraries to ensure the literature remains current and relevant. However, it has been determined that the current material serves the needs of this degree due to the extensive online database.

f. New or Renovated Space
No new or renovated space is required.

g. Other Expenses
Funds have been allocated for office materials, travel, professional development, course development, marketing, and additional scholarships.

h. Total Year
No additional explanation or comments needed.

M. Adequacy of Provisions for Evaluation of Program (as outlined in COMAR 13B.02.03.15):

1. Discuss procedures for evaluating courses, faculty and student learning outcomes.

The assessment process at the University consists of a series of events throughout the Academic Year. The results of each event are gathered by the University Assessment Team and stored in Canvas for analysis and use in annual reports, assessments, etc. The University Assessment Team analyzes the results, develops any necessary action plans, and monitors the implementation of the action plans.

Academic Year Assessment Events:

Fall Semester:

- At the August Faculty Retreat, the Faculty reviews any outstanding student learning challenges that have not been adequately addressed. The issues are brought to the Academic Dean for review and development of implementation plans.
- Faculty submit performance plans consistent with the mission and goals of the University and department. The documents are reviewed and approved by the Academic Dean.
- Department Chairs and Academic Dean review the Graduating Student Survey data.
- Department Chairs and Academic Dean review student internship evaluations.
- Department Chairs and Academic Dean review grade distribution reports from the spring and summer semesters.
- Department Chairs and Academic Dean review student course evaluations from the Summer Semester.
- Departments conduct Industrial Advisory Board meetings to review academic curriculum recommendations. The Advisory Board meets to begin curriculum review or address special

issues that may arise related to the curriculum. Based on an analysis and evaluation of the results, the Academic Dean, Faculty, and the advisory boards will develop the most effective strategy to move the changes forward.

  - NOTE: A complete curriculum review for degrees occurs every two years. In most cases, the changes only require that the Academic Dean inform the Vice President of Academic Affairs and University President and provide a report that includes a justification and the impact of the changes as well as a strategic plan. Significant changes typically require the approval of the Executive Council.

- The Academic Dean attend the Student Town Hall and review student feedback with Department Chairs.
- Department Chairs conduct interviews with potential employers at our Career Fair.
- Post-residency, the Academic Dean meet with the Faculty to review the student learning progress and discuss needed changes.

Spring Semester:

- Faculty Performance Plans are reviewed with Faculty to identify issues of divergence and to adjust the plan as needed.
- Department Chairs and Academic Dean review grade distribution reports from the Fall Semester.
- Department Chairs and Academic Dean review the Graduating Student Survey data.
- Department Chairs and Academic Dean review student course evaluations from the Fall Semester and the Spring Semester (in May before the Summer Semester begins).
- Department Chairs and Academic Dean meet to review the content of the graduating student, alumni, and course surveys to ensure the surveys continue to meet the university's assessment needs.
- At the Annual Faculty Summit in May, the faculty review and discuss student learning challenges from the past academic year and provide recommendations to the Academic Dean. The results also lead to implementation plans for improvement.
- Department Chairs conduct interviews with potential employers at our Career Fair.
- Departments conduct Industrial Advisory Board meetings to review academic curriculum recommendations.

In addition to these summative assessments, the Academic Dean meet with the Department Chairs every week to review current student progress. This formative assessment allows for immediate minor changes, which increase faculty effectiveness and, ultimately, student outcomes.

The Faculty Senate meets monthly from August through April. The Faculty Senate addresses issues that impact student outcomes as those issues emerge. The leadership of the Faculty Senate then provides a report on the matter to the Academic Dean. The report may include a recommendation or a request to move forward with a committee to examine the issue further. In most cases, the changes only require the Academic Dean to inform the Vice President of Academic Affairs and University President and provide a report that includes a justification and the impact of changes as well as a strategic plan. Significant changes typically require the approval of the Executive Council.

2. **Explain how the institution will evaluate the proposed program's educational effectiveness, including assessments of student learning outcomes, student retention, student and Faculty**

satisfaction, and cost-effectiveness.

Student Learning Outcomes:

Student learning outcomes for the proposed M**Ed in Cyber Science** will be measured using the instruments identified in Section G and Section M as well as the assessment measures dictated by the accreditation requirements of the University's regional accreditor [i.e., Middle States Commission in Higher Education (MSCHE)]. This program is designed to meet the requirements of MSCHE. The University will also evaluate student achievement of the learning outcomes using the UK Quality Assurance Agency for Higher Education (QAA) Framework for Higher Education Qualifications and its related assessment tools. The University is in good standing with all its accrediting bodies.

Student Retention:

The University maintains a comprehensive student retention program under the Vice President for Student Engagement. The program assesses student retention at all levels, including the individual course, major, and degree. During the semester and term, the University's Drop-Out Detective capability, within its Learning Management System (i.e., Canvas), provides an early alert at the course level to potential issues related to retention. Within the Office of Student Life, Academic Advisors monitor Drop-Out Detective and contact students who appear to have problems with their academic performance. The Academic Advisors work with each student to create a plan to remove any barriers to success. The Academic Advisors also work with the course instructors as needed to gain additional insight that may help correct the situation.

Each student also meets with their Academic Advisor each semester to evaluate their progress toward degree completion. An updated plan of action is developed for each student for their next semester's registration and each following semester through degree completion.

The Vice President for Student Engagement also meets regularly with the Vice President of Academic Affairs and Academic Dean to review student retention within each degree program and address any issues that appear to be impediments to degree completion.

Student and Faculty Satisfaction:

Evaluations and assessment of Student and Faculty satisfaction occur every semester. Faculty members are evaluated every semester by students enrolled in their courses. Students are required to complete a course evaluation online within a specified time frame at the end of the semester for every enrolled course, or they are locked out of Canvas (the University's Learning Management System) until they complete each survey. Every faculty member is also required to review each of their courses after each semester; the goal is to ensure up-to-date content, effective and efficient methods of delivery, and appropriate outcomes.

The Department Chairs and Academic Dean review the student evaluations for every course offered at the University. The Department Chairs and Academic Dean also review faculty satisfaction every semester. If changes are needed at the course level, the changes are developed and implemented by the Faculty upon approval of the Department Chairs and Academic Dean. If changes are required at the faculty level, the Department Chairs will make the changes. At the end of the following semester, appropriate stakeholders analyze the results of a follow-on evaluation for the effectiveness of the changes. This cycle is an ongoing process.

Cost Effectiveness:

Based on the year-long inputs, evaluations, and reviews described in Section M.1, the Department Chairs and Academic Dean prepare the proposed academic budget for each program for the upcoming year. Budget increases are tied to increasing student learning and performance as well as critical strategic initiatives.

The Interim Vice President of Finance and Administration also monitors each academic program throughout every semester and term for its cost-effectiveness. Additionally, the revenue and costs of every University program are reviewed annually by the Executive Council and Board of Trustees before approving the next year's budget.

N. Consistency with the State's Minority Student Achievement goals (as outlined in COMAR 13B.02.03.05 and the State Plan for Post-Secondary Education):

1. **Discuss how the proposed program addresses minority student access & success, and the institution's cultural diversity goals and initiatives.**
   Capitol Technology University is a majority-minority school. Our programs attract a diverse set of students who are multiethnic and multicultural. The University actively recruits minority populations for all undergraduate and graduate-level degrees. Special attention is also provided to recruit females into the STEM and multidisciplinary programs at all degree levels – undergraduate, master's, and doctoral. The University will use the same approach for the **MEd in Cyber Science .**

O. Relationship to Low Productivity Programs Identified by the Commission:

1. **If the proposed program is directly related to an identified low productivity program, discuss how the fiscal resources (including Faculty, administration, library resources, and general operating expenses) may be redistributed to this program.**
   This program is not associated with a low productivity program identified by the Commission.

P. Adequacy of Distance Education Programs (as outlined in COMAR 13B.02.03.22)

1. **Provide affirmation and any appropriate evidence that the institution is eligible to provide Distance Education.**
   Capitol Technology University is fully eligible to provide distance education. The University has a long history of providing high-quality distance education. The University is accredited regionally by the Middle States Commission in Higher Education (MSCHE) and through four specialized accrediting organizations: International Accreditation Council of Business Education (IACBE), Accreditation Board for Engineering and Technology (ABET), NSA, and DHS. All five accrediting organizations have reviewed the University's distance education program as part of their accreditation process. Capitol Technology University is fully accredited by MSCHE, IACBE, ABET, NSA, and DHS. The University is in good standing with all its accrediting bodies.

2. **Provide assurance and any appropriate evidence that the institution complies with the C-RAC guidelines, particularly as it relates to the proposed program.**

Capitol Technology University has a long history of providing high-quality distance education/online learning that complies with the Council of Regional Accrediting Commissions (C-RAC) Interregional Guidelines for the Evaluation of Distance Education. The University will also continue to abide by the C-RAC guidelines with the proposed **MEd in Cyber Science** .

a. Council of Regional Accrediting Commissions (C-RAC) Interregional Guidelines for the Evaluation of Distance Education.

1. **Online learning is appropriate to the institution's mission and purposes.**

   Online learning is consistent with the institution's mission, purpose, and history. Please refer to Section A of this proposal.

2. **The institution's plans for developing, sustaining, and, if appropriate, expanding online learning offerings are integrated into its regular planning and evaluation processes.**

   All programs at the University – online, hybrid, and on-ground – are subject to the same regular planning, assessment, and evaluation processes. Please see Section M of this proposal for the detailed process.

3. **Online learning is incorporated into the institution's systems of governance and academic oversight.**

   All programs at the University – online, hybrid, and on-ground – are subject to the same regular planning, assessment, and evaluation processes. Please see Section M of this proposal for the detailed process.

4. **Curricula for the institution's online learning offerings are coherent, cohesive, and comparable in academic rigor to programs offered in traditional instructional formats.**

   Online programs/courses meet the same accreditation standards, goals, objectives, and outcomes as traditional instruction at the University. The online course development process incorporated the Quality Matters research-based set of standards for quality online course design to ensure academic rigor of the online course is comparable to the traditionally offered course. The University Academic Dean, chairs, and faculty review curriculum annually. Courses are reviewed at the end of each term of course delivery. This process applies to online and traditional classes. In addition, advisory boards are engaged in the monitoring of course quality to ensure quality standards are met regardless of the delivery platform.

5. **The institution evaluates the effectiveness of its online learning offerings, including the extent to which the online learning goals are achieved, and uses the results of its evaluations to enhance the attainment of the goals.**

   Online programs/courses meet the same accreditation standards, goals, objectives, and outcomes as traditional classroom delivery. The University selects the learning platforms to ensure the high standards of the technical elements of each course. The Academic

Dean monitor any course conversion from in-class to online to ensure the online course is academically equivalent to the traditionally offered course and that the technology is appropriate to support the expected rigor and breadth of the course.

6. **Faculty responsible for delivering the online learning curricula and evaluating the students' success in achieving the online learning goals are appropriately qualified and effectively supported.**

   The Department of Doctoral Programs, where this degree will be sponsored, is staffed by a qualified University Academic Dean, Dr. Ian McAndrew, and supported by a Director of Doctoral Programs. Other appropriately credentialed Faculty with multi-disciplinary level skills will be part of the delivery process.

   The evaluation of the courses in the program will be done using the same processes as all other programs at the University. (Please see Section M.) All Capitol Technology University faculty teach in the traditional classroom environment and online. (Please see faculty qualifications in Section I of this document.)

7. **The institution provides effective student and academic services to support students enrolled in online learning offerings.**

   Students can receive assistance in using online learning technology via several avenues. Student aides are available to meet with students and provide tutoring support in both subject matter and use of the technology. Tutors are available in live real-time sessions using Zoom or other agreed-upon tools. Pre-recorded online tutorials are also available.

   In addition to faculty support, on-ground and online tutoring services are available to students in a one-on-one environment.

   Laboratories (on ground and virtual) are available for use by all students. Faculty and highly-qualified tutors staff the laboratories and provide academic support.

   Library services and resources are appropriate and adequate. Please refer to Section J of this document and the attached letter from the University President. The library adequately supports the students learning needs.

8. **The institution provides sufficient resources to support and, if appropriate, expand its online learning offerings.**

   The University has made the financial commitment to the program (please refer to Section L). The University has a proven record of accomplishment in supporting degree completion.

9. **The institution assures the integrity of its online offerings.**

   Current Faculty serve on internal advisory boards that examine possible for program changes, including course and program development. All Faculty are selected on domain expertise and program-related teaching experience.

When new Faculty or outside consults are necessary for the design of courses offered, the University's Human Resource Department initiates a rigorous search and screening process to identify appropriate Faculty to design and teach online courses. Again, all Faculty are selected on domain expertise and program-related teaching experience

The University online platforms offer several avenues to support instructors engaged in online learning. The Director of Online Learning Division is highly skilled and trained in faculty development. Several seminars and online tutorials are available to the Faculty every year. Mentors are assigned to new Faculty. Best practice sharing is facilitated through the Academic Dean, Department Chairs, and formal meetings.

The assessment for online learning classes/students is the same as for all academic programs at the University. Faculty provide required data on student achievement. The Learning Management System includes data on student achievement. Proof of these assessments is available during the class and following class completion to the Academic Dean and Department Chairs. On an annual basis, the information is reported to the University's accreditation authorities such as MSCHE and NSA/DHS.